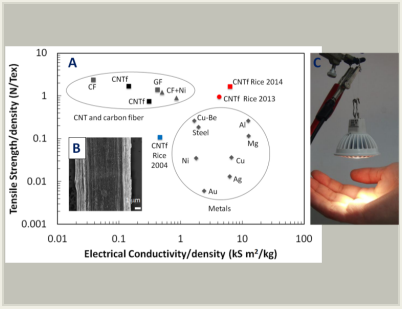
Small Business Innovation Research/Small Business Tech Transfer

Lightweight CNT Shielded Cables for Space Applications, Phase I

Completed Technology Project (2016 - 2016)

Project Introduction

The effects of electromagnetic interactions in electrical systems are of growing concern due to the increasing susceptibility of system components to electromagnetic interference (EMI), use of automated electronic systems, and pollution of the electromagnetic environment (EME) with electromagnetic emissions. The effects of EMI can be detrimental to electronic systems utilized in space missions; even small EMI issues can lead to total mission failure, resulting in significant mission delays and economic loss. Additionally, NASA is challenged to find ways of effectively shielding sensitive electronic equipment from EMI without adding significant weight to space flight vehicles and satellites in order to manage fuel costs. The solution for both issues resides in the use of carbon nanotubes (CNTs), which are advancing as the most promising solution for reducing the weight of spacecraft wires. CNTs are an alluring alternative to conventional conductors used in coaxial data cables because they combine mechanical strength, electrical conductivity, and low density. DexMat has developed a novel CNT deposition process for directly applying CNTs onto dielectric materials to produce an electrically conductive EMI shield. The high conductivity CNT fibers have the potential to replace the inner conductor in cables, improving their mechanical durability and providing comparable specific conductivity to copper. By placing a premium on the quality of raw CNTs, DexMat has created a product which will have increased potential to reduce cable weight while minimizing insertion losses when incorporated into wire. In the proposed research DexMat seeks to increase electrical conductivity of CNT films, produce cost competitive products, develop new quality assurance processes, and determine the long-term product reliability of CNT cables. Understanding these facets of CNT cable production will lead to enhancements on DexMat innovation and production of a commercially viable product.



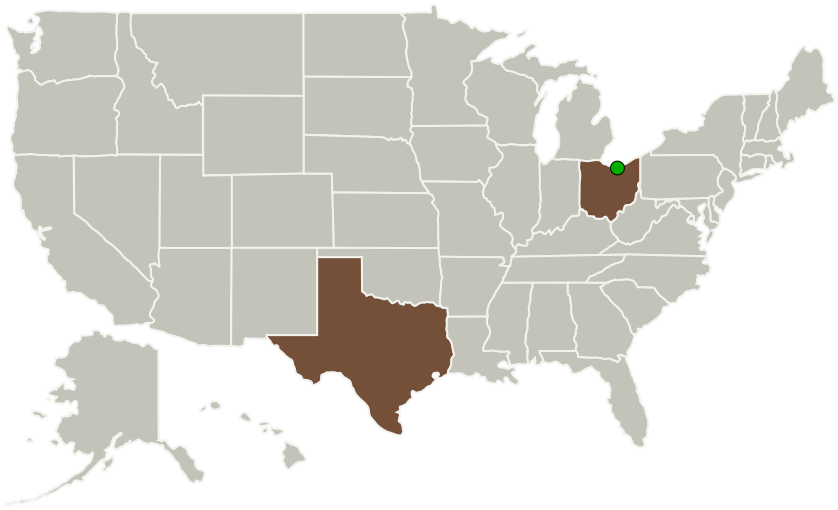
Lightweight CNT shielded cables for Space Applications, Phase I

Table of Contents

Lightweight CNT Shielded Cables for Space Applications, Phase I

Completed Technology Project (2016 - 2016)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Dexmat, Inc.	Lead Organization	Industry	Houston, Texas
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Texas

Project Transitions

June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139632)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Dexmat, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

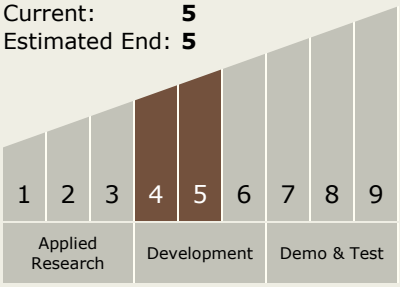
Carlos Torrez

Principal Investigator:

Alberto Goenaga

Technology Maturity (TRL)

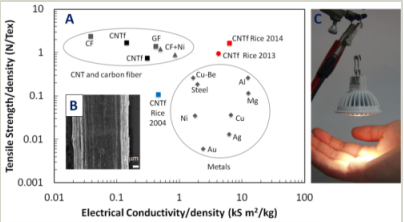
Start: **4**
Current: **5**
Estimated End: **5**



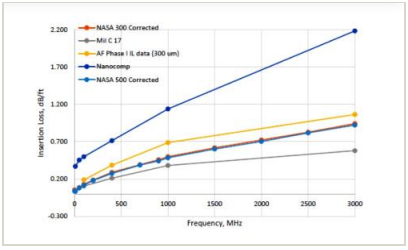
Lightweight CNT Shielded Cables for Space Applications, Phase I

Completed Technology Project (2016 - 2016)

Images



Briefing Chart Image
Lightweight CNT shielded cables for Space Applications, Phase I
(https://techport.nasa.gov/image/135344)



Final Summary Chart Image
Lightweight CNT shielded cables for Space Applications, Phase I Project Image
(https://techport.nasa.gov/image/125825)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.2 Distribution and Transmission

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System